

**WHAT IS CLAIMED IS:**

- 1                   1.       A method for screening a population of replicable genetic packages  
2   to obtain replicable genetic packages that display on their surface a fusion protein that  
3   specifically binds to a target molecule, the method comprising:  
4                   contacting a target molecule with an uncleared cell culture, wherein said  
5   culture comprises:  
6                   (a) replicable genetic packages, each of which displays on its  
7   surface a fusion protein that comprises a surface-displayed replicable genetic package  
8   polypeptide and a potential binding polypeptide; and  
9                   (b) cells in which the replicable genetic packages were amplified;  
10                  wherein said replicable genetic packages that specifically bind to said  
11   target molecule form complexes that comprise the target molecule and the replicable  
12   genetic packages.
- 1                   2.       The method of claim 1, wherein said potential binding polypeptide  
2   is encoded by a member of a library of nucleic acid molecules.
- 1                   3.       The method of claim 2, wherein said nucleic acid molecules are  
2   cDNA molecules.
- 1                   4.       The method of claim 2, wherein said nucleic acid molecules are  
2   recombinant products.
- 1                   5.       The method of claim 1, wherein said method further comprises  
2   separating from said complexes cells and/or replicable genetic packages that do not  
3   specifically bind to said target molecule.
- 1                   6.       The method of claim 5, wherein at least 70% of the cells originally  
2   present in the culture are removed.
- 1                   7.       The method of claim 6, wherein at least 90% of the cells originally  
2   present in the culture are removed.
- 1                   8.       The method of claim 5, wherein said cells and unbound replicable  
2   genetic packages are separated from said complexes using aspiration.

- 1                    9.        The method of claim 5, wherein the method further comprises  
2 eluting said replicable genetic packages that specifically bind to said complexes.
- 1                    10.      The method of claim 1, wherein the presence of said complexes  
2 that comprise the target molecule and the replicable genetic packages is assessed by  
3 contacting the complexes with a detection reagent that binds to said replicable genetic  
4 packages.
- 1                    11.      The method of claim 10, wherein said detection reagent comprises  
2 an antibody.
- 1                    12.      The method of claim 10, wherein the complexes are contacted with  
2 the detection reagent in the presence of the cells.
- 1                    13.      The method of claim 1, wherein the replicable genetic packages are  
2 selected from the group consisting of bacteriophage and eukaryotic viruses.
- 1                    14.      The method of claim 1, wherein said target molecule is  
2 immobilized on a solid support.
- 1                    15.      The method of claim 14, wherein said solid support is selected  
2 from the group consisting of: a bead, a chip, a microtiter plate, a prokaryotic cell and a  
3 eukaryotic cell.
- 1                    16.      The method of claim 1, wherein said target molecule is selected  
2 from the group consisting of: a polypeptide, a nucleic acid, an RNA, a DNA, a small  
3 organic molecule, and a carbohydrate.
- 1                    17.      The method of claim 1, wherein said potential binding polypeptide  
2 is an antibody.
- 1                    18.      The method of claim 17, wherein said antibody is a scFv or a Fab.
- 1                    19.      The method of claim 1, wherein said method is performed on an  
2 automated laboratory workstation.
- 1                    20.      A composition comprising:

- 2 (a) population of replicable genetic packages, each of which  
3 displays on its surface a fusion protein that comprises a surface-displayed replicable  
4 genetic package polypeptide and a potential binding polypeptide; and  
5 (b) a complex that comprises a target molecule and one or more  
6 members of the population of replicable genetic packages that specifically bind to said  
7 target molecule; and  
8 (c) cells in which the replicable genetic packages were amplified.

1 21. The composition of claim 20, wherein said replicable genetic  
2 packages are selected from the group consisting of bacteriophage and eukaryotic viruses.

1 22. The composition of claim 20, wherein said target molecule is  
2 immobilized on a solid support.

1 23. The composition of claim 20, wherein said solid support is selected  
2 from the group consisting of: a bead, a chip, a microtiter plate, a prokaryotic cell and a  
3 eukaryotic cell.

1 24. The composition of claim 20, wherein said target molecule is  
2 selected from the group consisting of: a polypeptide, a nucleic acid, an RNA, a DNA, a  
3 small organic molecule, and a carbohydrate.

1 25. The composition of claim 20, wherein said potential binding  
2 polypeptide is an antibody.

1 26. The composition of claim 25, wherein said antibody is a scFv or a  
2 Fab.

1 27. The composition of claim 20, wherein the composition further  
2 comprises a detection reagent that specifically binds to the replicable genetic packages.